Journal of Economics and Sustainable Development
ISSN 2222-1700 (Paper) ISSN 2222-2855 (Online)
Vol.4, No.17, 2013
www.iiste.org

Empirical Test of the Relationship Between Import Substitution and Trade Performance in Zimbabwe

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Abstract
The study on trade performance and import substitution assumes that there is both short run and long run relationship between export growth and the trade policy instruments. Trade performance in this research is represented by the movements in the net exports (trade gap) for the period of 1980-2009, and trade restriction is captured in import value index. The study uses vector error correction model for the analysis of multivariate time series. The main findings from the study, affirm that a set of variables have a long run relationship with the trade performance in Zimbabwe. The results also indicate that both short run and long run depreciation in the exchange rate encourages exports and discourages imports. Trade performance is negatively related to trade restriction as indicated in the study.
Keywords: Import substitution, trade performance, vector error correction model, multivariate time series

INTRODUCTION

During the past fifty years there have dramatic increases in the importance of trade in the world economy. Zimbabwe implemented reforms of the trade policy, among them were structural adjustment programs and market liberalization which aimed to dismantle policies of import substitution which were widely used in 1950s, 1960s, and 1970s.

Background: During the import substitution industrialization (ISI) of post-independence, government promoted exports through schemes like the export revolving fund, the export retention scheme and the incremental export bonus scheme. There was therefore a period during which ISI was encouraged under a protective trade regime and, at the same time, exports were encouraged through the foreign exchange allocation system.
In 1990, government abandoned the ISI strategy and the socialist ideology, in favor of an open market economy, by adopting the World Bank-sponsored economic structural adjustment program (ESAP). This dramatic policy change came about because of the deep economic problems that the country was facing in the second half of the 1980s. The country was experiencing stagnant economic growth, low levels of investment and, a high budget deficit and inflation, growing unemployment and a decay of infrastructure. From 1991 to 1995 the country adopted the Economic Structural Adjustment Program (ESAP). The successor of ESAP from 1996 to 2000 was the Zimbabwe Program of Economic and Social Transformation (ZIMPREST) and was further developed to Millennium Recovery Program and other recently launched policies like the National Trade Policy (2012).
Statement of the problem: Trade liberalization in developing countries has been seen to be much slower to get under way and import substitution policies found ready converts amongst policy makers particularly in newly independent countries. The belief that infant industries could be natured behind protective barriers was appealing. It again found strong support from vested interest that gained either from protection provided by or, from access rents created by non-tariff barriers. In Zimbabwe most studies have been centered on exports oriented policies and less work has been done to investigate the impact of import substitution to trade performance. Therefore the objective of this research is to establish the nature of the relationship that exists between trade performance and import substitution policies in Zimbabwe. It also sought to establish factors that determine trade performance.
Research objectives: The objective of this research was to establish the nature of the relationship that exists between trade performance and import substitution policies in Zimbabwe. It also sought to enhance policy makers understanding of the key dynamics within import substitution in Zimbabwe.
Delimitation of the study: The study used time series annual data from 1980 to 2009 during which Zimbabwe implemented import substitution. The data used were derived from Central Statistics Agency (CSA), Zimbabwe Revenue Authority (ZIMRA) and the Reserve bank of Zimbabwe (RBZ).

EMPIRICAL LITERATURE

Bruton H (1989) says that import substitution is a matter of two transitions, firstly the transition is that from a system characterized by lack of growth to a flexible, responsive system in which social welfare is continuously rising and this takes place behind protection and secondly from protection to participation on a more equally footing in the world economy. The research emphasized on conventional issues of import substitution which are tariff and exchange rate policy. Protection is one form which has characterized most developing countries

including (South Korea and Taiwan) whose development is classified as a success story. India has perhaps been more committed to import substitution than has any other large country. There is evidence that India has achieved technological maturity that exceeds that of any other developing country.
Nenci S and Pietrobelli C (2008) show that the relationship between tariffs and import growth in Latin America cannot be taken for granted. The analysis shows the existence of a long run relationship between tariffs and imports from the second half of the century.

ANALYTICAL AND EMPIRICAL FRAMEWORK

In estimating the Trade performance relationship to trade policy (Import Substitution) we follow the Johansen procedure and estimate the long run relationship with a vector error correction model (VECM). VECM captures the long run and the short run relationships that exist among variables under study. In order to know if VECM is appropriate, a co-integration test has to be conducted. Forecasts from the VECM can be augment information coming from other models. They also provide alternative views of what could happen in the economy and give some information about the balance of risks and also impulse responses.
Trade performance in this research is represented by the movements in the net exports (trade gap) for the period of 1980-2009, and trade restriction is captured in import value index (2000=100) in the sense that to reach to the ultimate value of imports, tariffs are a component of import value.
The study follows the Johansen procedure and estimate the long run relationship with a vector error correction model framework as follows

$Xt=\Phi Xt\text{-}1+\ldots\ldots\ldots\Phi pXt\text{-}p+\varepsilon t$

Error correction representation ($Xt=Xt\text{-}1+\Delta Xt$)

$\Delta Xt=\prod Xt\text{-}1+\Delta Xt\text{-}i+\varepsilon t$

Specifically,

$\Phi j = -$ $j = 1\ldots p-1$

$\prod =-(1-\Phi 1-\ldots-\Phi p) =-\Phi(1)$

The characteristics polynomials is $1-\Phi 1Z-\ldots-\Phi pZp =\Phi(z)$

If $\prod = 0$, then there is no cointegration. Non stationary of 1(1) type vanishes by taking differences. If $\prod$ has full rank, k, then the X's cannot be 1(1) but are stationary $\prod\text{-}1\ \Delta Xt = X\prod\text{-}1\ \varepsilon t$ the interesting case is rank ($\prod$) = M, 0 < M < K, as this is the case of cointegration

$\prod = \alpha\beta 1$

(K x K) = (K x M)[(K x M)1]

Where the columns of β contain the M cointegrating vectors, and the columns of α then M adjusted vectors

Rank ($\prod$) = min [Rank (α), Rank (β)]

Therefore, specifically for this study the model specification is as follows

$TPt=\beta 0+\beta 1\ TPt\text{-}1-\beta 2Tarrift+\beta 3EXRt+\varepsilon t$

$TPt=TPt\text{-}1+\Delta TPt$ (error correction representation)

$\Delta TP=\beta 0+\Delta Tarifft\text{-}1+\Delta EXRt\text{-}1+\delta Ut\text{-}1+\varepsilon t$

TP- is the trade performance which captured in net exports for the period 1980 to 2009
Ut-1=error correction term
EXR-is the exchange rate for the period under study
β 1……..β3 shows the sensitivity of each of the macroeconomic variables
$^{\delta}$- error correction coefficient capturing the adjustment of the variables towards long-run equilibrium and the coefficients of change of the variables are expected to capture the short run dynamics adjustments test which measures the proportion of the disequilibrium from one period that is corrected in the next period

Prior to estimations, the long run movement of the variables were tested using the augmented Dickey-Fuller (ADF) tests on all variables. This is necessary because the classical inference in models was developed essentially for stationary processes and help avoid the problem of 'spurious' regression whose typical symptoms are in values of adjusted R^2 and low values of the Durbin-Watson (DW) statistic (Hendry, 1986).
We begin by estimating a general model which includes several lagged differences and the level variables lagged once to capture long run effects. The general-to-specific regression strategy is then used to reach a robust preferred model. At each step in the testing down procedure, diagnostic tests are used (for serial correlation (autocorrelation), autoregressive heteroscedasticity and normality).

Descriptive statistics of the variables: 1980 to 2009

	EXR	NX	TRF
Mean	484478,3	3,51E+ 08	2,16E+08
Median	0,0008100	3,84E+08	101,6126
Maximum	14040000	5,72E+09	6,25E+09
Minimum	0,000600	-1,64E+09	49,50683
Standard Deviation	2607098	1,20E+09	1,16E+09
Skewness	5,1102516	2,937727	5,102520
Kurtosis	27,03569	15,27391	27,03571
Jarque-Bera	823,9106	223,7469	823,9123
Observations	29	29	29

Not forgetting that Benchmark values for these two measures are zero for symmetric distribution and three for one which is normally dispersed. From the table, NX is lowly skewed than tariff and exchange rate with 5,1(1sgf) relative to a 2,9 (NX) approaching normal dispersion. A very low median has been reported in the exchange rate variables of 0, 00081 and high median in tariff of 101, 6126.Table (4.2)

The tests were carried out with an intercept and no trend and the results are as follows.

Variable	Coefficient	Std Error	t-stats	Probability	Decision		
EXR	C	-272,5334	-1,631014	40,20214	25,24866	-6,779077	-0,064598	0,000
0,9491	stationary	1(1)						
NX	C	-1,033304	3,13E+08	0,311481	2,73E+08	-3,317386	1,145254	0,0028
0,2629	1(1)	stationary						
Tariff	C	-1,076923	2,40E+08	0,287820	2,40E+08	-3,741657	1,000000	0,0010
0,3269	1(1)							

From the table, we conclude that ADF value is greater than the t-critical value at 95% level of significance for all variables. Based on these results the null hypothesis that the series have unit roots in their levels is rejected meaning that the three series are stationary at their first difference levels.

We conclude that, trade performance (NX), tariff and exchange rates are stationary series at their first difference which therefore allows us to further test for cointegration the objective being to determine whether or not NX, tariff and EXR variables have a long-run relationship in a multivariate frame work.

The Johansen cointegration test results;

Hypothesized number of CE(s)	Likelihood Ratio	5% Critical	1% Critical	Eigen value
None **	977,0880	29,68	35,65	1,00000
At most 1 **	39,95298	15,41	20,04	0,657543
At most 2 **	12,09114	3,76	6,65	0,371892

(**)* denotes rejection of null hypothesis at 5% (1%) significance level.

LR test indicates 3 cointegrating equations at 5% significance level. From the table H0:r =0 andH1 : =k+1/r=1 and we can reject null hypothesis of no cointegration.If we continue this we therefore can safely conclude that there 3 cointegration relationship among Net exports (Trade performance and real exchange rate and Tariff) by rejecting null hypothesis of no cointegration at 5% significance level.

Therefore there are three cointegrating equation as shown table (4.1.3)

(1) EXR = 1,40Et +15 – 3,253725NXt + 6, 43E-10 TRFt …… (1)
[6.4E+13] [0, 01798]

EXR = -7, 490789 – 9, 53E-12 TRFt ……(2)
9.9E-11

NX = -4,29E + 08 – 2, 00E-16TRFt…….. (3)
[4, 2E-9]

From equation (1) there appears to be a long run relationship linking exchange rate to trade performance. The long run coefficients are economically and statistically significant. Again in the equation we can conclude that changes in real exchange rate affect net export negatively this is indicated by a negative coefficient of -3,25. This can be supported by the data available in the appendix indicating trade deficits that characterize the period especially from 1991 to 2009 with deteriorating exchange rates year by year from the same period. The ESAP era and post ESAP and pre ESAP era we can attribute the negative relationship to the ESAP policies for example the financial liberalization that led to liquidity problems landing Zimbabwe in acute foreign currency shortages. The shortage of foreign currency exacerbated by lack of investment. Naturally, without investment, critical economic variable e.g. Gross National Product, Inflation, unemployment. These problems forced the economy to

go on a spree to import scarce commodities hence the spiraling budget deficit exerting,. In turn, pressure on the local currency to depreciate. Another evidence was the currency valuation between July and September 1991, when the Zimbabwean dollar was 35% vis-as-vis the currencies of its major trading partners and this affected manufacturers who were importing production imports and consequently goods produced and sold on either foreign or domestic market were obviously highly priced and uncompetitive.

The second equation indicates that real exchange rate is negatively related to tariffs with a coefficient of -9, 53E-12 TRFt for the period 1980 to 2009.

EXR = -7.490789-9.53E-12TRFt

(9.9E-11)

The equation shows negative relationship between the exchange rate and trade restriction {Tariff} this is shown by a -9,5 E12 coefficient which is economically significant This means a one percent change in exchange rate will yield a -9,5E 12 change the rate of tariff This is supported by theory when exchange rate appreciates ,it becomes cheap to import more and red export fall and this invites trade restrictions in form of tariffs . Again an exchange depreciation reduces imports and encourages exports ,ceteris paribus and this generally reduces tariff {trade restriction }Tariff protection reduces exports by raising the cost of production thereby reducing profits and raising profitability of supplying the domestic market. A Limitation is that in explaining export relationship, is that domestic prices are themselves a function of foreign prices, measured in domestic currency, tariff rates and other variables. According to Edwards.L {2006} a 1% depreciation reduces exports by {0;64%} in the long run This coefficient is similar to those found by Smal 1996, Montengro1998

NX = -4.29 -2.00E11TRFt…….(3)

A negative relationship that shown between net exports {trade gap} and tariff .In the long run it means that a 1% change in the net export will result in the reduction of tariff by 2;00Tarriff affect exports though their impact on domestic prices . It reduces exports thereby widening the gap What can be concluded, tariff negatively affects trade gap {N X} ,a real exchange rate depreciation has positive impact on reduction of the trade gap {N X}

Tariff affect trade performance in two ways ,raising prices of imported input and reduces profitability of export production .Tariff {nominal} raise the relative return to production for the domestic market causing firms to shift production and of the export market and into the domestic market.

The coefficient of tariff is negative supporting our expectations; these were the similar results from an estimated long run relationship between import growth tariffs in a study by Edwards. L and Lawrence R.Z (2006) which had the following equation

LM = 0,877 PMU/ PMAN – 0,369LTARSURP + 0,749LCT + 0,229LGDFITOT of significance is the relationship that exists import demand (LM) and the L TARSURP which is the tariff. Therefore, it's economically significant that import values can rise either through a depreciation of exchange rate or rise in prices of foreign prices which can be incorporated in the import value index which is capturing Tariff for this study. In the case of Zimbabwe Exchange rate fluctuations that characterized the period 1991 – 2009 could have coupled with export promotion programmes suggests negative relationship between exchange rate and tariff.

Error correction model

As suggested by cointegration theory we have inquired into the existence of possible cointegrating relationships between dependent variable and the exogenous variable for the selected time period. The procedure of differencing produces loss of long run information in the data. Indeed, if the existence of cointegrating relationship is proved, using a first differentiating model is not a proper choice because it would ignore a movement source of variables (Hamilton, 1994). The theory of cointegration addresses this issue by introducing an error correcting term. The EC term lagged one period integrates short run dynamics in the long run function. The long run parameters and ECM are estimated using E views and it is the common method of analysis when you need to take into consideration not only short run dynamics among variables but also the long run economic relationship.

The specification of the general error correction model takes the following form;

Mt =a0+ 1iyt-i+ 2ipt-i+ 3itt-i+ 4imt-i+a5ECt-1+a6dumt+μt

ECt-1 =$^{\delta}$1lnMt-1+$^{\delta}$2lnYt-1+$^{\delta}$3lnPt-1

Below are the results of EC Model.

Table 4.14 E C M results

Error correction	H0	H1	ΔlEXR	ΔlTRF
CointEq1	r≠0	r=1	-0,768240	
(0.18584)				
(4.13378)	0.052784			
(0.36838)				

(0.14329)
ΔlEXR(-1) r≤1 r=2 -1,971341
(0.46005)
(-4,28509) -0.091852
(0.91189)
(-0.10073)
ΔlTRF(-1) r≤1 r=2 0.007550
(0.09101)
(0.08296) -0.500175
(0.180339)
(-2.77274)
R2 =0.548329
Adusted-Rsquared =0.552385
Akaike AIC =4.710095
Schwarz SC=4.947989

From the table the results are reported in logs and as rule of thumb the error correcting term should be negative and significant and that the absolute value of the equilibrium error should lie between 0and1 expressed in percentages. The cointergation equation 1 in the table indicates the significant long run relationship with a negative coefficient of 77% rate at which the exchange rate adjust back into the long run equilibrium which is very high. However, the tariff is insignificant. In the short run, it can be stated that exchange rate, tariff are some of the main driving forces of changes in trade performance .The significant of error correction term for both EXR and TRF implies that market forces are always in operation to restore long run equilibrium following a short run disturbance

The exchange rate from the table indicates that it's affected by the previous levels in the short run because it's significant; the speed of adjustment coefficient is197% rate much higher than in the long run. But there is no significant short run relationship between the short run changes in the exchange rate and the tariff. Another significant error correcting term is that of the tariff which is having 50%speed of adjustment in the short run which is much lower than that of the exchange rate indicating that exchange rates adjust faster than does the tariff into the long run equilibrium. The t- statistics indicate the significant e model in this case are more than two error correction terms can be indicated and the equation. The short run coefficients for cointegration equation suggests that short run changes in the exchange rate have a great impact on the trade performance than does the trade restriction. Note that tariff is significant in the first and insignificant in the second lag .We can conclude that both variables can affect the trade performance in the short run but the in the long run the tariff proved to be insignificant.

The R^2 in the table is very high showing that 55% variations in the Trade performance (NX) can be explained in the independent variables that is the real exchange rate and tariffs same applies to adjusted R- squared. The log likelihood which indicates that a simultaneous unit change in the exogenous variable i.e. Tariff and Exchange rate will lead to -141 in probability change in the endogenous trade performance (NX). The AIC (Akaike Information Criterion) and Schwarz are shown in the table to determine the number of lags that makes the error term a white noise and the chosen model has the lowest AICand SC value .

CONCLUSION AND RECOMMENDATIONS

The main findings from the study, affirm that a set of variables have a long run relationship with the trade performance in Zimbabwe. The results also indicate that both short run and long run depreciation in the exchange rate encourages exports and discourages imports. This is indicated in the negative coefficient of tariff. The trade gap widens as long as the imports are increasing at a rate faster than exports could to the movements in imports.

We also conclude that protective effects of tariffs, quotas and licenses in developing countries such as Zimbabwe, are frequently reinforced by distortions in foreign exchange market. The trade restriction as measured by taxation of imports and exports are significantly and robustly correlated with trade volumes in Zimbabwe. Tariff in Zimbabwe has not accounted for improvements in levels of exports as anticipated.

The manufacturing sector contributes significantly to the Zimbabwean economy in terms of GDP, exports, employment and value addition to locally produced raw materials. The sector developed over time but the performance has been declining due to the deep political and socio-economic crises that the country has experienced in the past twelve years.

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